

Appn. No.: 10/657,944
Amendment Dated: November 3, 2005
Reply to Office Action of July 5, 2005

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Amendments to the Claims: This listing of claims will replace all prior versions, and listings, of claims in the application

Listing of Claims:

1. (Currently Amended) A band elimination filter, comprising:

an input terminal and an output terminal;

one capacitor between a first terminal connected to said input terminal and a second terminal connected to said output terminal; wherein

said first terminal is grounded via only a first grounding point;

said second terminal is grounded via only a second grounding point,

a first acoustic resonator is connected between said first terminal and said first grounding point, and

a second acoustic resonator is connected between said second terminal and said second grounding point, and

a normalized impedance, which is obtained by normalizing a characteristic impedance of said input terminal or said output terminal, is smaller than 1.5.

2. (Previously Presented) The band elimination filter according to claim 1, wherein said acoustic resonators are surface acoustic wave resonators formed on a principal surface of a piezoelectric substrate.

3-7. (Canceled)

8. (Currently Amended) The band elimination filter according to claim 1 or 2, further comprising an inductor having a first end coupled to the input terminal and a second end coupled to the output terminal.

9-10. (Canceled)

11. (Previously Presented) The band elimination filter according to claim 1, wherein said capacitor is a chip component.

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12. (Previously Presented) The band elimination filter according to claim 1, wherein said capacitor is formed on a piezoelectric substrate.

13. (Previously Presented) The band elimination filter according to claim 1, wherein said capacitor is formed in a mounting substrate on which said band elimination filter is mounted.

14. (Original) The band elimination filter according to claim 13, wherein said mounting substrate is a laminated body having a dielectric layer.

15. (Original) The band elimination filter according to claim 13, wherein said acoustic resonators are face-down mounted on said mounting substrate.

16. (Original) The band elimination filter according to claim 2, wherein electrode pads of said surface acoustic wave resonators which are grounded are separated from each other on said piezoelectric substrate.

17. (Previously Presented) The band elimination filter according to claim 1, wherein said acoustic resonators are piezoelectric resonators.

18. (Currently Amended) The band elimination filter according to claim 17, wherein said piezoelectric resonators are a-bulk wave resonators having an upper electrode, a lower electrode and a piezoelectric layer sandwiched between said upper electrode and said lower electrode.

19. (Original) The band elimination filter according to claim 18, wherein said piezoelectric layer is composed of a piezoelectric thin film.

20. (Currently Amended) The band elimination filter according to claim 18, wherein said reactance-elementcapacitor is formed using said electrodes of at least one of said bulk wave resonators.

21. (Previously Presented) The band elimination filter according to claim 1, wherein said first and second acoustic resonators have different resonance frequencies.

22. (Currently Amended) The band elimination filter according to claim 1, wherein said ground pointone-end of each of said acoustic resonators is independently grounded by wiring on a substrate.

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23. (Canceled)

24. (Previously Presented) A filter device comprising a plurality of filters wherein at least one of the plurality of filters is a band elimination filter according to claim 1.

25. (Original) An antenna duplexer, comprising:

a transmission filter; and

a receiving filter;

wherein a band elimination filter according to claim 24 is used as said transmission filter or said receiving filter.

26. (Currently Amended) A communication apparatus, comprising:

transmission means of transmitting a signal;

receiving means of receiving a signal, and

wherein a band elimination filter according to claim 1 is used in said transmission means and/or said receiving means.

27. (Currently Amended) The band elimination filter according to claim 1 having passing characteristics that decreases attenuation in line in a center frequency portion of the pass-band toward a higher frequency portion center-frequency of the pass-band .

28. (Currently Amended) A band elimination filter, comprising:

an input terminal and an output terminal;

one-a first inductor between a first terminal connected directly to said input terminal and a second terminal connected to said output terminal; wherein

said first terminal is grounded via only a first grounding point;

said second terminal is grounded via only a second grounding point,

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a first acoustic resonator is connected between said first terminal and said first grounding point, and

a second acoustic resonator is connected between said second terminal and said second grounding point.

29. (Currently Amended) The band elimination filter according to claim 28 or 32 having passing characteristics that decreases attenuation in a center frequency portion of the pass-band toward a higher-frequency portion center-frequency of the pass-band.

30. (Previously Presented) The band elimination filter according to claim 1, wherein

a first inductor is connected between said first grounding point and said first acoustic resonator, and

a second inductor is connected between said second grounding point and said second acoustic resonator.

31. (Currently Amended) The band elimination filter according to claim 28 or 32, wherein

a second inductor is connected between said first grounding point and said first acoustic resonator, and

a third inductor is connected between said second grounding point and said second acoustic resonator.

32. (New) The band elimination filter according to claim 28, wherein a normalized impedance, which is obtained by normalizing a characteristic impedance of said input terminal or said output terminal, is smaller than 1.5.

33. (New) The band elimination filter according to claim 28 or 32, wherein said acoustic resonators are surface acoustic wave resonators formed on a principal surface of a piezoelectric substrate.

34. (New) The band elimination filter according to claim 28 or 32, further comprising a capacitor formed on a piezoelectric substrate, and connected between the first terminal and the second terminal.

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35. (New) The band elimination filter according to claim 28 or 32, further comprising a capacitor formed in a mounting substrate on which said band elimination filter is mounted and connected between the first terminal and the second terminal.

36. (New) The band elimination filter according to claim 35, wherein said mounting substrate is a laminated body having a dielectric layer.

37. (New) The band elimination filter according to claim 35, wherein said acoustic resonators are face-down mounted on said mounting substrate.

38. (New) The band elimination filter according to claim 33, wherein electrode pads of said surface acoustic wave resonators which are grounded are separated from each other on said piezoelectric substrate.

39. (New) The band elimination filter according to claim 28 or 32, wherein said acoustic resonators are piezoelectric resonators.

40. (New) The band elimination filter according to claim 39, wherein said piezoelectric resonators are a bulk wave resonators having an upper electrode, a lower electrode and a piezoelectric layer sandwiched between said upper electrode and said lower electrode.

41. (New) The band elimination filter according to claim 40, wherein said piezoelectric layer is composed of a piezoelectric thin film.

42. (New) The band elimination filter according to claim 28 or 32, wherein said first and second acoustic resonators have different resonance frequencies.

43. (New) The band elimination filter according to claim 28 or 32, wherein said ground point end of each of said acoustic resonators is independently grounded by wiring on a substrate.

44. (New) A filter device comprising a plurality of filters wherein at least one of the plurality of filters is a band elimination filter according to claim 28 or 32.

45. (New) An antenna duplexer, comprising:

a transmission filter; and

a receiving filter,

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wherein a band elimination filter according to claim 44 is used as said transmission filter or said receiving filter.

46. (New) A communication apparatus, comprising:

transmission means of transmitting a signal;

receiving means of receiving a signal, and

wherein a band elimination filter according to claim 28 or 32 is used in said transmission means and/or said receiving means.